

CLAIMS

1. A substrate cutting system for cutting a bonded substrate formed by bonding a first substrate and a second substrate into a plurality of cut substrates, the system for cutting a substrate of the bonded substrate comprising:

a first cutting device located so as to face the first substrate;

a second cutting device located so as to face the second substrate; and

a cutting apparatus comprising the first cutting device and the second cutting device,

wherein the first cutting device comprises a scribing portion for forming a scribing line on the first substrate,

the second cutting device comprises a scribing portion for forming a scribing line on the second substrate,

the first cutting device further comprises a back up portion for supporting a surface of the first substrate when scribing means of the scribing portion of the second cutting device scribes the second substrate, in correspondence with the portion to be scribed, and

the second cutting device further comprises a back up portion for supporting a surface of the second substrate when scribing means of the scribing portion of the first cutting device scribes the first substrate, in correspondence with the portion to be scribed.

2. A system for cutting a substrate of a bonded substrate according to claim 1, wherein:

the first cutting device further comprises a breaking portion for cutting the first substrate along the scribing line formed on the first substrate; and

the second cutting device further comprises a

breaking portion for cutting the second substrate along the scribing line formed on the second substrate.

5 3. A system for cutting a substrate of a bonded substrate according to claim 2, wherein:

the first cutting device locates the back up portion so as to support a surface of the first substrate when breaking means of the breaking portion of the second cutting device cuts the second substrate, in correspondence with the portion  
10 to be cut; and

the second cutting device locates the back up portion so as to support a surface of the second substrate when breaking means of the breaking portion of the first cutting device cuts the first substrate, in correspondence with the portion  
15 to be cut.

4. A system for cutting a substrate of a bonded substrate according to claim 1, further comprising a substrate carrying apparatus which sequentially positions lines to be cut of  
20 the bonded substrate with respect to the cutting apparatus.

5. A system for cutting a substrate of a bonded substrate according to claim 4, wherein the substrate carrying apparatus comprises a plurality of tables.  
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6. A system for cutting a substrate of a bonded substrate according to claim 5, wherein the tables are independently movable.

30 7. A system for cutting a substrate of a bonded substrate according to claim 5, wherein the tables respectively comprise adsorption holes for adsorbing the bonded substrate.

8. A system for cutting a substrate of a bonded substrate according to claim 2, wherein the breaking means provided in each of the breaking portions of the first cutting device and the second cutting device press both sides of the scribing line.

9. A system for cutting a substrate of a bonded substrate according to claim 8, wherein the breaking means are rollers each having a concave portion formed thereon.

10. A system for cutting a substrate of a bonded substrate according to claim 1 or 2, further comprising:

supporting rollers included in the second cutting device; and

a belt wound to the supporting rollers, wherein a portion of the bonded substrate which has been cut is supported as the second cutting device performing a cutting process moves.

11. A system for cutting a substrate of a bonded substrate according to claim 1 or 2, comprising a plurality of cutting devices, and wherein the cutting devices are integrally movable in a scribing line direction.

12. A system for cutting a substrate of a bonded substrate according to claim 1 or 2, wherein:

a pair of the cutting apparatuses are provided and the substrate carrying apparatus is provided for each of the cutting apparatuses, and

a cut substrate which has been cut by a cutting device of one of the cutting apparatuses is carried by one of the substrate carrying apparatuses, which corresponds to the cutting apparatus, to the other substrate carrying apparatus

to be cut by another cutting device provided in correspondence with the other cutting apparatus.

5 13. A system for cutting a substrate of a bonded substrate according to claim 12, wherein the substrate carrying apparatuses are provided such that carrying directions for the bonded substrate and the cut substrate by the substrate carrying apparatuses are perpendicular to each other.

10 14. A system for cutting a substrate of a bonded substrate according to claim 12, wherein:

the substrate carrying apparatuses carry the bonded substrate with a surface of the bonded substrate being in parallel with the vertical direction; and

15 the first cutting device and the second cutting device of the cutting apparatus cuts the carried bonded substrate along the vertical direction.

20 15. A system for cutting a substrate of a bonded substrate according to claim 14, comprising a pair of the cutting apparatuses and further comprising a rotation carrying apparatus for rotating a cut substrate which has been cut by one of the cutting apparatuses in a direction perpendicular to the vertical direction,

25 wherein the cut substrate rotated by the rotation carrying apparatus is cut by the other cutting apparatus along the vertical direction.

30 16. A system for cutting a substrate of a bonded substrate according to claim 15, further comprising a scribing apparatus for forming a terminal portion in the cut substrate which has been cut by the other cutting apparatus.

17. A system for cutting a substrate of a bonded substrate according to claim 15, further comprising a cutting apparatus for forming a terminal portion in the cut substrate which has been cut by the other cutting apparatus.

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18. A substrate cutting method for cutting a bonded substrate formed by bonding a first substrate and a second substrate into a plurality of cut substrates, the method for cutting a substrate of the bonded substrate comprising:

10           a first cutting device located so as to face the first substrate;

          a second cutting device located so as to face the second substrate; and

15           a cutting apparatus comprising the first cutting device and the second cutting device,

          wherein the first cutting device supports a surface of the first substrate when the second substrate is scribed by the second cutting device, in correspondence with the portion to be scribed, and

20           the second cutting device supports a surface of the second substrate when the first substrate is scribed by the first cutting device, in correspondence with the portion to be scribed.

25           19. A method for cutting a substrate of a bonded substrate according to claim 18, wherein:

          the first cutting device supports a surface of the first substrate when the second substrate is cut by breaking means of the breaking portion of the second cutting device,  
30           in correspondence with the portion to be cut; and

          the second cutting device supports a surface of the second substrate when the first substrate is cut by breaking means of the breaking portion of the first cutting device,

in correspondence with the portion to be cut.

20. A method for cutting a substrate of a bonded substrate according to claim 18, wherein lines to be cut of the bonded  
5 substrate held by a substrate carrying apparatus are sequentially positioned to predetermined positions with respect to the cutting apparatus, and the bonded substrate is sequentially cut along the lines to be cut.

10 21. A method for cutting a substrate of a bonded substrate according to claim 20, wherein:

the substrate carrying apparatus comprises a plurality of tables; and,

15 before the cutting, the number of tables moved is selected in accordance with a cutting pattern of the bonded substrate, spaces between the tables are set such that the second cutting device is moved along a line to be cut of the bonded substrate, and the bonded substrate is held on the selected tables.

20 22. A method for cutting a substrate of a bonded substrate according to claim 21, wherein the tables holding cut substrates sequentially move to a material removing position for the cut substrates after the cutting.

25 23. A method for cutting a substrate of a bonded substrate according to claim 19, wherein the breaking means included in each of the first cutting device and the second cutting device press both sides of the scribing line.

30 24. A method for cutting a substrate of a bonded substrate according to claim 18 or 19, further comprising:

a supporting roller included in the second cutting

device; and

a belt wound to the supporting roller,

wherein a portion of the bonded substrate which has been cut is supported as the second cutting device performing a cutting process moves.

25. A method for cutting a substrate of a bonded substrate according to claim 18 or 19, wherein a plurality of cutting devices are provided, and the cutting devices integrally move and cut the bonded substrate along a plurality of lines to be cut of the bonded substrate.

26. A method for cutting a substrate of a bonded substrate according to claim 18 or 19, wherein:

a pair of the cutting apparatuses are provided and the substrate carrying apparatus is provided for each of the cutting apparatuses, and

a cut substrate which has been cut by a cutting device of one of the cutting apparatuses is carried by one of the substrate carrying apparatuses, which corresponds to the cutting apparatus, to the other substrate carrying apparatus to be cut by another cutting device provided in correspondence with the other cutting apparatus.

27. A method for cutting a substrate of a bonded substrate according to claim 26, wherein the substrate carrying apparatuses are provided such that carrying directions for the bonded substrate and the cut substrate by the substrate carrying apparatuses are perpendicular to each other.

28. A method for cutting a substrate of a bonded substrate according to claim 26, wherein:

the substrate carrying apparatuses carry the bonded

substrate with a surface of the bonded substrate being in parallel with the vertical direction; and

the first cutting device and the second cutting device of the cutting apparatus cuts the carried bonded substrate  
5 along the vertical direction.

29. A method for cutting a substrate of a bonded substrate according to claim 28, comprising a pair of the cutting apparatuses and further comprising a rotation carrying  
10 apparatus for rotating a cut substrate which has been cut by one of the cutting apparatuses in a direction perpendicular to the vertical direction,

wherein the cut substrate rotated by the rotation carrying apparatus is cut by the other cutting apparatus  
15 along the vertical direction.